

successful curriculum mapping

Fostering Smooth
Technology Integration

Distributed Computers

Media Center

Support for Tech Literacy

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Subject: Curriculum design for
technology integration

Standards: NETS•T II, III ([http://
www.iste.org/standards/](http://www.iste.org/standards/))

Four years ago, the staff at our school (Marie C. Graham Elementary School in Harrison Township, Michigan) agreed to take an evaluative look at the use of technology in the classroom. Through a self-study process and a district technology initiative called Project 2000, teachers had the opportunity for change relative to technology integration. I (Pamela) was heavily involved as principal at Graham, and my co-author, Barbara, served as the project consultant.

The vision behind the project emerged from a concern held by the district administration regarding the lack of acceptance of technology by the teachers; the poor technology skills of the students entering middle school; and too much focus on integrated learning systems, which was observed as limiting the teachers' overall understanding of technology integration.

Elementary schools in the district had the opportunity to apply for the project if the school had the support of at least 75% of the staff. Additionally, staff had to commit to 40 hours of professional development beyond their regular workdays. Our school supported the project with 100% agreement. We became one of only three elementary schools within a three-year period to apply and receive the opportunity to embark on a technology adventure. The district provided a technology consultant on site and minimal direction allowing flexibility, creativity, and site-based decision making based on best practice and current research. The initial challenge I presented to the staff was to "dare to dream" beyond gadgets, bells, and whistles.

We believe **technology** can be used as a tool for **communication** and **inquiry** through a **constructivist approach**—fostering student learning through **real-life applications**.

As a critical first step, the staff studied constructivist learning theory and the role technology plays in the learning process. We developed a vision that would drive our decision making relative to technology and curriculum integration: "We believe technology can be used as a tool for communication and inquiry through a constructivist approach—fostering student learning through real-life applications."

Staff evaluated their current use of technology based on research-based best practice, professional development needs, the building's school improvement plan, and North Central Accreditation (NCA) Goals, and we then agreed on a plan of action. The evaluation of the technology vision resulted in the following suggestions as identified by the staff:

- Integrate technology into the curriculum.
- Transform traditional lessons.
- Support staff within the building creating a team effort with building experts/mentors identified; staff support with outside consultant.
- Use the media center as the nucleus for collaborative research, investigation, and communication.
- Share resources and ideas.
- Distribute computers to eliminate computer labs.

Our building technology team wanted technology to be "transpar-

ent" in that teachers would not have students involved with technology for technology's sake. Technology, to be truly transparent, requires teachers to recognize that technology is one of many tools available for teaching and learning. We wanted teachers to see the value of technology to help their students and themselves complete tasks, to see that some tasks are easier to accomplish with technology or cannot be done at all without it, and to recognize the benefits of using technology in the classroom. Far too often, teachers are eager to identify a multitude of software applications to address skill-based instruction rather than looking for curriculum connections that encourage higher-level thinking.

Another consideration of the technology team was to help expand the teachers' view of technology beyond productivity tools. I encouraged the team to lead the teachers away from a view of technology as a management tool toward a view of it as a teaching and learning tool. Barbara was convinced that teachers needed to be aware of a new literacy for technology that extends beyond drill and practice, student research, and pupil management systems. The challenge became one of allowing our teachers to see that a limited number of productivity applications can address a multitude of learning levels and curriculum standards.

	Social Studies	Science	Reading	Writing	Spelling	Math
August/ September	<ul style="list-style-type: none"> • Map skills • Michigan Natural Resources • Regions • Great Lakes 	<ul style="list-style-type: none"> • Weather • Michigan 	<ul style="list-style-type: none"> • Establish routine of Reading Workshop • Reading informational texts 	<ul style="list-style-type: none"> • The Writing Life: Launching the Writing Workshop • Assessment of student writing • Routines and rituals of Writing Workshop 	<ul style="list-style-type: none"> • Spelling Center & Guided Spelling as needed. Also concentration on High Frequency Words, as needed. • Word wall • Intro 	<ul style="list-style-type: none"> • Lessons 1.1–2.3 • Routines • Review • Assessment • Adding and Subtracting whole numbers

Teachers at Marie C. Graham Elementary School began by deciding which topics to cover in each month of the school year.

To help students meet the challenges of an information-saturated society, Barbara determined that it was important for our teachers to become fluent in a new literacy—information and data collection and analysis. The new literacy assumes that teachers are able to:

- use abstract reasoning and assist students in the collection of information and application to new learnings
- apply information in unique ways to help students represent knowledge and understanding of new content across disciplines and subject areas
- interpret vast amounts of information analytically and represent data collection in ways that assist students with organizational frameworks of understanding to have a deep understanding of pedagogy, best practices, and content knowledge
- continue to explore, adapt, and seek to understand new technologies and their applications in teaching and learning as they emerge

With the focus of structuring our technology integration efforts, the staff moved forward to reorganize the school and determine professional development options.

Distribution Model

Our first step toward technology integration was to recognize that use and availability go hand in hand. The faculty decided to take apart our computer lab and move to a distribution model for our computers. We placed all of the lab computers in classrooms; however, merely placing computers in classrooms does not guarantee use. For technology integration to occur, we found it necessary to initially understand and organize the content of the curriculum by grade level. The process we used for this purpose was curriculum mapping. Barbara and I examined and combined several resources to develop the process we used for curriculum mapping. The steps we identified included:

- Using the school calendar, create a matrix that defines the month in

which the content of each curricular area will be taught.

- Look for connections across the curriculum.
- Select an organizer for the unit (e.g., a theme or topic).
- Select a conceptual thread (e.g., change over time, interdependency).
- Identify curriculum content standards, expectations, and assessments.
- Develop 2–5 essential questions for each curriculum area and unit. We followed H. Lynn Erickson's advice to develop three different kinds of questions, as described in her 2000 book *Stirring the Head, Heart, and Mind*:
 - *Conceptual*—"Why do governments set immigration quotas?"
 - *Factual*—"Why did the colonists in early America resist British control?"
 - *Philosophical*—"Should countries have borders?"
- Choose an instructional methodology (e.g., project based, inquiry based, activity based, or a combination of methodologies).
- Develop lessons, activities, and collaborative projects.

Our teachers continue to work on essential questions and instructional methodology because these are complex processes. However, the curriculum mapping process serves as a vehicle to create a more horizontal

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approach, thereby making the content areas intertwined and the learning/teaching more inquiry based. The results of this process allowed technology integration to occur (and make sense to teachers) in the final two steps.

Support for Technology Literacy
Professional development and the development of a technology literate faculty and staff was not an easy task. We used a variety of professional development delivery systems in

our attempts to expand the faculty's knowledge base. Barbara and I met weekly to discuss the informal conversations we shared with teachers regarding their questions, concerns, and needs. Collaboratively, we developed instructional examples and selected teacher resources to aid in the teachers' learning process. Teachers attended sessions before and after school to learn about general technology literacy. Each grade-level team also met with Barbara to discuss the curriculum map they had created. Discussions included topic areas, and

Unit/Topic/Theme	Process Skills	Technology Connections	Standards/Benchmarks/Expectations (adapted)	Essential Questions
Weather	Data collection and observation	Use the Internet for weather conditions/weather cam. Place data on Excel spreadsheet or Graph Club for ongoing weather data collection. Video broadcasting with weather reports.	<ul style="list-style-type: none"> • Describe weather conditions. • Describe seasonal changes in Michigan's weather. 	<p>How does weather affect people and the environment?</p> <p>What information can we obtain from changing weather conditions?</p>
Plants	Measurement/Prediction	Journey North. Plant tulips for spring collection of data. Form hypotheses of bulb depth, growth pattern, planting location. Collect data on bulb size.	<ul style="list-style-type: none"> • Analyze how parts of living things are adapted to carry out specific functions. 	<p>What commonalities exist between local climates to allow for plant growth?</p>
Michigan/Map/Geography	Acquiring and organizing information	Read Me on the Map by Joan Sweeney. Use draw/paint program to create maps. Use Kid Pix to create bird's eye view representation of specific areas in Michigan. Scan photos for display of Michigan locations to place on large map or create big book. Use Excel or Graph Club to determine areas most frequently visited by students. Use predetermined Internet sites to collect information regarding the geography and important locations of Michigan.	<ul style="list-style-type: none"> • Sketch maps of the region. • Describe places, cultures, and communities. • Describe the geography of Michigan, its history, and reasons for change. • Describe and compare location characteristics for human adaptation. 	<p>Why do we need maps?</p> <p>How do maps help us?</p> <p>How does geography affect people and locations?</p>
Launching Writing Workshop	Writing process skills	Establish computer pod in classroom for students to use for writing process with Kidspiration/Inspiration for prewriting; word processing for publishing; Word for word processing; PowerPoint to begin e-portfolios for writing pieces; and digital cameras to collect photos for seed ideas in writer's notebook.	<ul style="list-style-type: none"> • All students will demonstrate the ability to write clear and grammatically correct sentences, paragraphs, and compositions. • All students will demonstrate, analyze, and reflect upon the skills and processes used to communicate through writing. 	<p>How can technology assist us as writers?</p>

Teachers added technology-based activities to ensure that technology was integrated across the curriculum.

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the teachers identified core ideas and planned assessments. It was then that Barbara suggested technology integration activities that correlated with the instructional techniques and student outcomes. Teachers constructed and linked the technology integration curriculum map to the instructional curriculum map. This map served as an evaluative tool to determine the progress and the needs of the teachers and students.

Approximately every two months, teachers met with Barbara to go over the changes in the map and the training or support needs. The teachers made changes in the technology map as they became aware of student capabilities—what might have been considered too difficult a task in November was considered possible by March.

As teachers and students became more proficient with their use of technology, we observed the teachers testing, reflecting, or modifying their actions relative to their curriculum maps. Essentially, the teachers made more connections between curriculum content and technology. The technology and curriculum were blended into instructional methodology that was more thematically based and inquiry driven. Professional development became easier to deliver as teachers uncovered what they did not know about technology. Teachers also learned what their students could accomplish using technology. Training needs sometimes involved the simple task of reviewing a spreadsheet application for charting and graphing or constructing templates for students' digital portfolios.

Not until teachers had mapped their curriculum and integrated tech-

nology on their maps did they really see what skills they needed to help students learn. The acknowledgement that they needed support to help their students was the beginning of a journey of continued individual and collective learning for teachers and staff members. Teacher training often happened on an as needed or just in time basis. They continued to learn as their students learned, and they broadened their skills to extend the use of technology for future years.

As the instructional leader of the building, I felt it necessary to learn side by side with the teachers. I was faced with similar a-ha moments as well as challenges as we engaged as students together in a mostly unknown world of technology.

Having a support system in the school allowed the teachers to believe that "things" will work. Success breeds success, and it is the nature of teachers to share their successes, especially when they have a common vision.

Media Center

In addition to the distribution model, staff transformed the media center into a hub of learning. The model included a presentation area that allowed students and teachers opportunity to communicate new learning to a variety of audiences, including parents, other students, teachers, and new faces through distance learning. This area houses a data projector,

compressed video, and electronic whiteboard presentation area. The individual work or research area contains 27 multimedia computers, 8 wireless laptops, digital microscopes, digital cameras, and a video broadcasting room with video editing equipment available to individuals and groups of students.

To facilitate collaborative inquiry, our media specialist, computer paraprofessional, media clerk, and consultant formed an outstanding team of support experts. This team provided teachers and students with a wide range of opportunities for research, professional development, and collaboration supporting inquiry-based learning. Teachers signed up each week for student and classroom activities and collaborated with the media specialists through e-mail messages, forms, and informal hallway conversations. This way the team provided support and resources based on need. The media center reflected an open concept, allowing all students the opportunity to access multiple resources on an ongoing basis. Our hope is to have the media support team develop themes, centers, and special projects in support of curricular needs by grade level.

Transformation of Traditional Lessons

One of the original goals of our technology plan was the transformation of traditional lessons. As teachers became more aware of the appropriate use of technology, new learning scenarios occurred. Teachers envisioned possibilities for the use of technology to extend learning in different ways.

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The classroom transformed into a room without walls, providing students with opportunities to construct their own knowledge in different ways. WebQuests, distance learning, and collaborative projects replaced more traditional approaches to learning. It was wonderful to see what interventions teachers constructed when knowledge of the curriculum, learning process, and technology came together in their minds.

Shared Resources and Ideas

For teachers to use technology appropriately, they need to have support and be encouraged to take risks. Teachers felt encouraged because of the availability of example lessons, activities, and student examples found on the district intranet. These examples are classified under subject, topic, and grade level. In addition, teachers placed the technology maps on the district intranet with student examples attached such as writing samples, Kid Pix projects, and e-portfolios. This process allowed teachers immediate access to view the product, understand the steps to follow, and observe the work that students at a particular grade level are capable of. The opportunity to view student products served as a "passive" form of professional development. We found that the more reluctant teachers felt encouraged to venture into technology integration when they could see possibilities and assess the quality of student work.

Lessons Learned

As a result of the project, teachers envision technology as a self-directed learning tool in our school. Valuable lessons learned include:

- Collaborating, taking risks, and sharing resources are critical to the change process.
- Recognition of adult levels of learning is essential to the delivery of support services to teachers.

- Professional development must be ongoing and offered as needed.
- The curriculum mapping process, an understanding of what students must know, and best practice methodologies are all critical to the teachers' understanding of the technology's fit and capabilities to enhance the learning process.
- Technology increases the opportunities for self-directed learning for both students and staff.

Technology does not drive instruction; rather, curriculum is the driving force in the application of technology. Project 2000 has been a successful beginning of our vision to create limitless learning opportunities for our students. We have realized that we need to continue revisiting our curriculum maps, our foundation for technology integration. Teachers' deep understanding of the curriculum and how students learn must be developed to avoid the pitfall of using technology for technology's sake.



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Barbara LaBeau began her career in education as a media specialist and now has her own consulting company focusing on technology integration. She is a long-time ISTE member and has been a member of MACUL since its establishment in 1975. Being actively involved in technology in education for more than 30 years provides her a unique perspective on technology's growth.

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